

Applicants have submitted new pages 1-4 of the specification, both in redlined and non-redlined form, that including the appropriate subject headings.

The Examiner refused to accept the drawings that were previously submitted on February 14, 2002. In particular, the Examiner asserted that the “guide means” were not shown in any of the submitted figures. During the telephonic interview, however, the Examiner indicated that the “guide means” was sufficiently described in the specification as corresponding to the central recess (5a) in the February 27, 2002 Amendment and Reply to obviate this rejection. The Examiner therefore indicated that this rejection would be withdrawn.

The Examiner also objected to the amendment filed on February 27, 2002. The Examiner has asserted that, in his opinion, the February 27, 2002 amendment introduced new matter into the disclosure. In particular, the Examiner has asserted that the term “base” and “base portion” were not recited in the original specification. During the October 17, 2002 interview, however, the Examiner and the Examiner’s supervisor indicated that the February 27, 2002 amendment would be acceptable if the specification were further amended to further define the base and/or the base portion in relation to the remainder of the adapter block. Applicants have therefore further amended the specification to describe the base portion of the adapter block as being located generally below the sockets for accommodating the test tube reaction vessels. As all of these features were shown in the originally-filed drawings and claims, both the Examiner and the Examiner’s supervisor acknowledged that no new matter would be introduced with the submission of this amendment.

The Examiner rejected claims 1-20 under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. In claim 1, the Examiner asserted that it was unclear if the claim included the magnetic stirrer as an element of the invention. In response to this concern, Applicants confirm that the magnetic stirrer is not intended to be an element of this claim. If the Examiner requires additional information and/or amendments to clarify this issue, he is encouraged to contact the attorneys for Applicants at his earliest convenience.

The Examiner has asserted that claims 2 and 3 did not include any structural differences and, therefore, were duplicative of each other. In order to advance the prosecution of the case, Applicants have cancelled claim 2 and amended claim 3 to be dependent upon independent claim 1. Applicants are canceling claim 2 with the full understanding that the Examiner believes there is absolutely no difference in scope or protection between these claims and that no scope or protection is being surrendered by this cancellation. If the Examiner has any questions concerning this action, he is strongly encouraged to contact the attorneys for Applicants as soon as possible.

The Examiner also asserted that it was unclear what the term “its” was referring to in claims 1, 11 and 15. Applicants have therefore amended each of these claims to describe how the centers of each vessel are distributed outside the periphery of the recess, eliminating any ambiguity in these claims. The Examiner also rejected claim 13 because the terms “the magnetic field” and “the laboratory magnetic stirrer” lacked sufficient antecedent basis. Both of these terms have been corrected to comply with the formal requirements of 35 U.S.C. § 112.

The Examiner also rejected claims 6, 10 and 12-13 under 35 U.S.C. § 112, second paragraph, for "omitting essential structural cooperative relationships of elements". In particular, the Examiner has asserted that there is no structural relationship to other elements in the claims for the condenser, the gas manifold and the hot plate.

In response to this rejection, Applicants have amended claims 6, 10 and 13 as describing the condenser unit and/or the gas manifold as being operatively connected to the adapter block. This arrangement is clearly shown and supported in Figures 3 and 4 of the present application. Applicants have also amended claim 12 to describe the hot plate as being operatively connected to the magnetic stirrer.

The Examiner rejected claims 1-5 and 8 under 35 U.S.C. § 102(b), as being anticipated by U.S. Patent No. 3,594,129, issued to Jones. The Examiner has asserted that all of the features in these claims are shown and described in the Jones reference. In response to this rejection, Applicants have amended claim 1 to describe the adapter block as being removable from the laboratory magnetic stirrer. As is clearly described at page 1 of the originally filed application, [one of the problems with carrying out parallel syntheses in the laboratory is that a majority of existing laboratory magnetic stirrers are only designed to accommodate and efficiently stir the contents of one reaction vessel at a time. The present invention is therefore directed to the development of an adapter block that is separate from the laboratory magnetic stirrer, yet can be used with and is inherently adaptable with multiple stirrers that have been in use in the marketplace for several years, such as those described on page 2 of the application. The Jones reference does not describe, teach or suggest such an inherently removable adapter block that is structurally distinct from the remainder of the

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laboratory unit. In particular, the Examiner is directed to column 3, lines 10-15, of the Jones reference, where the "turntable" is described as being rotatably mounted upon an upstanding hollow shaft, and wherein the hollow shaft is threaded at the upper end so that it can be securely fastened to the turntable. Nowhere in the Jones reference is it taught that the "turntable" is intended to be easily removable without having to remove a fastener and can be adapted for use on multiple stirrup magnetic stirrers, as is specifically described in the present application.

The Examiner has rejected claims 1-5, 7-9 and 11 under 35 U.S.C. § 103(a), as being unpatentable over U.S. Patent No. 3,356,346, issued to Landsberger, in view of the Jones reference. The Examiner has asserted that the Landsberger reference discloses all of the features of these claims with the exception of the adapter block being chemical resistant and the reaction vessels being located around the periphery of the recess.

Notwithstanding the Examiner's assertion, Applicants respectfully traverse the Examiner's rejections. In particular, it would not have been obvious to one of ordinary skill in the art to modify the device described in the Landsberger reference such that the individual vessels are located on the outside of the recess. As Applicants previously discussed in detail in their February 14, 2002 Amendment and Reply, having the reaction vessels arranged outside the periphery of the magnetic stirrer results in a number of benefits which are not taught, disclosed or even suggested in either of the prior art references. By having the individual vessels located outside of the recess within the adapter block, the user is capable of ensuring that equal magnetic forces apply to all of the reaction vessels simultaneously. In particular, by having each individual vessel spaced equidistant from the center of the magnetic source, the

user is able to ensure that a substantially equal magnetic force is applied to each vessel. This feature was obviously not recognized in the Landsberger reference, as the individual reaction vessels are spaced at various distances from the center of the "adapter block". The Jones reference on the other hand, does not even discuss the concept of magnetic stirring. It is therefore not reasonable to suggest that a person skilled in the art would recognize that an issue of efficient uniform stirring even exists by examining the Jones reference. For these reasons it would not have been obvious to one skilled in the art to incorporate the position of the vessels in the Jones reference with the device described in the Landsberger reference.

Second, Applicants previously described in their February 14, 2002, Amendment and Reply that by having the base of the reaction vessels located outside the periphery of the recess, the reaction vessels can be located at a relatively low level compared to the prior art, even to the point of being in line with the magnetic rotor. This feature promotes highly efficient and effective stirring. This is not taught, disclosed or suggested in either of the prior art references. In the Landsberger reference, all of the vessels are located well above the magnetic rotor, while the Jones reference does not disclose a magnetic stirring apparatus at all. For these reasons, it would not have been obvious to one of ordinary skill in the art to combine the Landsberger and Jones references in the manner asserted by the Examiner.

New Platter
The spec only recites that the block is vessels are effectively positioned to effectively locate the reaction vessels for stirring

The Examiner also rejected claims 6, 10 and 12-20 under 35 U.S.C. § 103(a), as being unpatentable over the Landsberger reference, in view of the Jones reference, and in further view of Application No. 97/09353, in the name of Baker. The Examiner has asserted that the use of a gas manifold and/or a condenser is taught by the Baker reference and that it

would have been obvious to incorporate the heating and cooling system of the Baker reference with the Landsberger and Jones references.

In response to this rejection, Applicants reiterate that it would not have been obvious to combine the Landsberger and Jones references for the reasons described above. In particular, it would not have been obvious to locate the plurality of reaction vessels on the periphery of the adapter block outside of the recess thereof, as the problem of uneven stirring qualities is not even suggested by the Landsberger or Jones references, nor is the advantage of more efficient uniform stirring taught, disclosed or suggested by the two references. This feature is also not taught, disclosed or suggested by the Baker reference. Furthermore, claims 18 and 20 specifically require that the base portion of each of the vessels be capable of being located at substantially the level of the recess. This feature is not taught, disclosed or suggested in any of the three references cited by the Examiner. In fact, the Landsberger reference teaches away from section arrangement, since a number of the reaction vessels are located directly above where the recess would be located. For all these reasons, Applicants submit that claims 6, 10 and 12-20 are patentable over the prior art cited by the Examiner.

Applicants therefore submit that all outstanding objections and rejections have been overcome by the aforementioned amendments and remarks, and that each of claims 1 and 3-20 are now in condition for allowance. A check for \$55.00 is included with the submission of this reply for a one-month extension of time. The Examiner is hereby authorized to charge any deficiency or credit any overpayment to Deposit Account No. 06-1450. A duplicate copy of this action is attached for this purpose.

Respectfully submitted,

Date:

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By:

Michael D. Rechtin

Michael D. Rechtin

Registration No. 30,128

FOLEY & LARDNER
One IBM Plaza, Suite 3300
330 North Wabash Avenue
Chicago, Illinois 60611-3608
Telephone: (312) 755-1900
Facsimile: (312) 755-1925

Marshall J. Brown
Registration No. 44,566



PARALLEL REACTION STATION WITH MAGNETIC STIRRING

BACKGROUND OF THE INVENTION

The present invention relates to a device capable of accommodating a plurality of reaction vessels being specifically adapted so that when placed in a magnetic field, such as that generated by a laboratory magnetic stirrer, any reaction vessel accommodated by the device is in an effective position for stirring with respect to the magnetic field.

In the field of organic chemistry it is often desirable to perform a variety of related chemical reactions simultaneously under similar reacting conditions. The technique for performing such reactions simultaneously is known as parallel synthesis.

One of the problems associated with carrying out parallel syntheses in the laboratory is that the majority of existing laboratory magnetic stirrers are only designed to accommodate and efficiently stir the contents of one reaction vessel at any one time. Accordingly, such equipment is not suitable for use in parallel synthesis.

Laboratory magnetic stirrers specifically designed for use in parallel synthesis are known. However, such apparatus, conventionally known as parallel reaction stations are only available as complete units incorporating a source of magnetic flux together with a frame for accommodating reaction vessels. These units are very costly in comparison to laboratory magnetic stirrers. The present device is advantageous over known devices in that it allows a conventional magnetic stirrer to be used for parallel synthesis and hence provides significant economic advantages compared with parallel reaction stations.

BRIEF SUMMARY OF THE INVENTION

A means has now been found which permits the use of existing laboratory magnetic stirrers in parallel syntheses by providing a device which is capable of securely accommodating a plurality of reaction vessels said device being specifically adapted so that when correctly located within a magnetic field generated by a laboratory magnetic stirrer each and every reaction vessel is effectively positioned for stirring with respect to the magnetic field. Thereby, any reaction vessel,

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placed in the device and equipped with a magnetic stir bar, is subject to smooth and efficient agitation.

Thus, the present invention provides a device comprising an adapter block, the adapter block containing fixing means for holding a plurality of reaction vessels, wherein when the adapter block is co-operatively positioned within a magnetic field generated by a laboratory magnetic stirrer each and every position for holding a reaction vessel is effectively located for stirring with respect to the magnetic field.. Preferably, the fixing means will comprise a plurality of sockets each designed to securely accommodate a reaction vessel.

Optionally the device may incorporate guide means which engage with the laboratory magnetic stirrer thereby ensuring the adapter block is correctly located within the magnetic field of the laboratory magnetic stirrer such that each and every position for holding a reaction vessel is effectively located for stirring with respect to the magnetic field. Suitably the guide means will ensure the adapter block is effectively positioned such that each and every position for holding a reaction vessel is effectively located for equivalent stirring with respect to the magnetic field. Preferably, the guide means comprises a raised rim around a central recess.

The adapter block may be cast in any suitable form, however in a particularly preferred arrangement the adapter block is circular in shape. The adapter block may be used in co-operation with any laboratory magnetic stirrer with a suitable circular magnetic/hotplate. Preferred laboratory stirrers include the IKA RCT basic hotplate stirrers, the IKAMAG REO, the Heidolph MR3001, the Heidolph MR3002, and the Heidolph MR3000.

The sockets for securely accommodating the reaction vessels may be located at any position on the device in which they are effectively positioned for stirring with respect to the magnetic field. In a particularly preferred arrangement the sockets are arranged about the perimeter of the adapter block.

Preferably the adapter block is made of chemically resistant material for example PTFE or a metal such as aluminum or stainless steel.

The adapter block may optionally be constructed from heat conducting material for example aluminum or stainless steel. Thereby, when the device is used in co-operation with a hotplate/magnetic stirrer heat generated by the hotplate will be efficiently transferred to the reaction vessels accommodated by the device.

Preferably the adapter block or condenser unit will incorporate a gas manifold. Thereby, gas flow or vacuum supply to each of the reaction vessels may be individually controlled. The gas manifold may be located anywhere on the device, however in a particularly preferred arrangement the gas manifold is located at the centre of the parallel reaction station.

The adapter block is capable of being constructed to accommodate any size laboratory reaction vessel however 16 and 24 mm o.d. test tubes are particularly preferred.

Optionally the device may incorporate a condenser unit such that the contents of the reaction vessels may be heated to reflux. Suitably, the condenser unit will be assembled such that the unit is in direct contact with the reaction vessels as they project from the adapter block. Preferably the condenser unit will be constructed from a material of high specific heat capacity for example stainless steel. In a particularly preferred embodiment the unit is condenser liquid cooled.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWINGS

Preferred embodiments of the invention are described in detail below, by example only, with reference to the accompanying drawings, wherein:

Figure 1 is a perspective view of the adapter block working in co-operation with a laboratory magnetic stirrer.

Figure 2 is a plan view of the adapter block.

Figure 3 is a cross-section of the adapter block.

Figure 4 is a perspective view of the adapter block together with a condenser unit working in co-operation with a laboratory magnetic stirrer.

Figure 5 is a plan view of the condenser unit.

Figure 6 is a cross-section of the condenser unit along line A.

DETAILED DESCRIPTION OF THE INVENTION

The device illustrated in Figure 1 comprises the adapter block (1) which is constructed from PTFE and is circular in shape with sockets (2) suitable for securely accommodating the test tube reaction vessels (3) located about the perimeter of the device. One face of the device is equipped with a central recess whereby the stirrer plate of the magnetic stirrer (5) is secured within the recess thereby ensuring that the device is effectively located for stirring within the magnetic field. A gas manifold comprising a gas inlet (4) and gas outlets (4a) is located at the centre of the adapter block.

Figures 2 and 3 show the location of the gas inlet (4) and gas outlets (4a) more clearly. Figure 3 illustrates guide means, shown generally at 23, comprising the central recess (5a) formed by the raised rim (5b) in the base of the adapter block (1) below the sockets (2) for accommodating the reaction vessels (3), which ensure the adapter block is correctly located within the magnetic field of the laboratory stirrer.

The device shown in Figures 3 and 4 comprises an adapter block (11) and a condenser unit (12) both of which are constructed from aluminum and are circular in shape. The adapter block comprises fixing means in the form of sockets (13) located about the perimeter of the device suitable for accommodating the test tube reaction vessels (14). The condenser unit contains openings (15) through which the test tube reaction vessels pass. The condenser unit is equipped with inlet/outlets (18) which permit cooling fluid to flow through the condenser unit. The adapter block and condenser unit are substantially parallel to one another. One face of the adapter block is equipped with a recess whereby the hotplate of a hotplate/magnetic stirrer (16) may be secured within the recess thereby ensuring that the adapter block is effectively located within the magnetic field. A gas manifold, shown generally at 21, comprising a gas inlet (17) and gas outlets (17a) is located at the centre of the condenser unit.